RECIPROCAL ASSOCIATIONS BETWEEN YOUTH'S RESPONSES TO INTERPERSONAL STRESS AND DEPRESSION: THE MODERATING ROLE OF SEX

BY

ANNA M. AGOSTON

THESIS

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Advisers:

Professor Karen Rudolph
Professor Howard Berenbaum

ABSTRACT

This study examined reciprocal associations between responses to interpersonal stress and depression in youth. Specifically, it tested the hypothesis that depression predicts fewer effortful, planful responses to peer stress and more involuntary, dysregulated responses over time, and that these types of responses then predict future depression. In addition, sex differences in these reciprocal associations were explored. Youth (*M* age = 12.41; *SD* = 1.19; 86 girls, 81 boys) and their maternal caregivers completed semi-structured interviews and questionnaires at three annual waves. Path analyses were conducted to examine associations between responses to stress and depression. Multi-group comparison analyses revealed sex differences in these associations; in girls, maladaptive interpersonal stress responses predicted depression, whereas in boys, depression predicted maladaptive interpersonal stress responses. These findings indicate that engaging in adaptive responses to stressful interpersonal situations may be more important for girls' than boys' psychological well-being, and that boys' stress responses may be more susceptible than girls' to their mood states. Findings are discussed with regard to interventions designed to prevent the onset and persistence of depression.

TABLE OF CONTENTS

INTRODUCTION

Research examining the association between youths' responses to stress and depression may be useful in clarifying the ways in which depression negatively impacts youth (Compas, Champion, & Reeslund, 2005). Given that depressed youth experience numerous social impairments that interfere with adaptive interpersonal functioning (Birmaher, Ryan, Williamson, Brent, Kaufman, Dahl, et al., 1996), youth experiencing depression may demonstrate more maladaptive responses to stressful interpersonal situations than nondepressed youth. These responses may, in turn, heighten youths' vulnerability for future depression. The present research examined this reciprocal-influence process in the context of the peer group. Specifically, we explored the notion that depression predicts fewer effortful, planful responses to peer stress and more involuntary, dysregulated responses over time, and that these types of responses then predict future depression. Moreover, we explored possible sex differences in these reciprocal associations.

Conceptualizing Responses to Stress

To conceptualize responses to stress, we drew from Compas and colleagues' framework (Compas, Connor, Osowiecki, & Welch, 1997; Compas, Connor, Saltzman, Thomsen, & Wadsworth, 1999). This framework distinguishes between effortful (i.e. controlled, purposeful) coping responses and involuntary (i.e., automatic, dysregulated) responses (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001). Effortful and involuntary responses are each further separated into engagement (i.e. directed toward the source of stress or stress-related emotions or cognitions) versus disengagement (i.e. directed away from the source of stress or stress-related emotions or cognitions) (Connor-Smith, Compas, Wadsworth, Thomsen, & Saltzman, 2000). Effortful engagement includes responses such as problem solving, emotion

regulation, and emotion expression, whereas effortful disengagement includes responses such as denial, avoidance, and wishful thinking. Involuntary engagement includes responses such as rumination, intrusive thoughts, and physiological arousal, whereas involuntary disengagement includes responses such as emotional numbing, involuntary avoidance, and inaction (Connor-Smith et al., 2000).

Linkages between Responses to Stress and Depression

Concurrent research suggests that voluntary disengagement responses to stress are associated with more depression (Dumont & Provost, 1999; Ebata & Moos, 1991; Herman-Stahl, Stemmler, & Petersen, 1995; Herman-Stahl & Petersen, 1996), whereas voluntary engagement responses to stress are associated with less depression (Compas, Malcarne, & Fondacaro, 1988; Herman-Stahl et al., 1995; Herman-Stahl et al., 1996). Involuntary responses to stress typically are associated with more depression and internalizing symptoms (Connor-Smith et al., 2000; Thomsen, Compas, Colletti, Stanger, Boyer, Konik, 2002). Specifically in the context of peer stress, youth who show more passive and avoidant coping responses to *in vivo* peer rejection (Reijntjes, Stegge, Terwogt, Kamphuis, & Telch, 2006) and youth who show fewer adaptive coping responses to hypothetical peer rejection (Reijntjes, Stegge, & Terwogt, 2006) exhibit more depression. Similarly, youth who show more unconstructive responses to peer victimization display higher levels of internalizing symptoms (Kochenderfer-Ladd, 2004).

Although these studies support a linkage between responses to stress and depression, they do not shed light on the direction of effect. Consistent with transactional interpersonal models of depression (Cicchetti & Toth, 1998; Coyne, 1976; Joiner, 2002), we proposed that there would be reciprocal associations between youths' responses to their social environment and the development of depression. Specifically, maladaptive responses to peer stress may foster future

depression, whereas adaptive responses may protect youth from the negative effects of stress over time. In turn, depression and associated deficits may, over time, undermine youths' ability to respond adaptively to stress.

Responses to Stress as an Antecedent of Youth Depression

Maladaptive responses to peer stress may increase youths' vulnerability to depression through several pathways. When youth respond with avoidance, inaction, or rumination rather than engaging in active efforts to resolve problems or to manage their emotions, they may experience unresolved problems or may even generate additional stress, which, in turn, promotes or sustains depression (Hammen, 2006). Ongoing social disruption may make it difficult for youth to maintain healthy peer relationships that are protective against depression (Rose & Rudolph, 2006). For example, deterioration in the quality of youths' relationships and social networks may reduce the amount of social support they receive, thereby increasing risk for depression (Vernberg, 1990). Failing to resolve peer stress and to effectively manage emotions also may lead youth to appraise themselves more negatively, promoting feelings of low self-efficacy and self-worth, hopelessness, and other negative affect (Cicchetti, Rogosch & Toth, 1994; Garber, Weiss, & Shanley, 1993; Hankin & Abramson, 2001), whereas active efforts to engage with stressors and emotions may protect against depression.

Although little prospective research has examined this proposed association in the context of peer stress, a few longitudinal studies support the idea that maladaptive responses to stress serve as an antecedent of depression. For example, disengagement responses, such as avoidance, predict more depression (Blalock & Joiner, 2000) and internalizing symptoms (Litt, Tennen, Affleck, & Klock, 1992; Stanton & Snider, 1993; Terry & Hynes, 1998), whereas task-focused or engagement responses predict less depression (O'Brien, Bahadur, Gee, Balto, &

Erber, 1997; Sandler, Tein, & West, 1994) and internalizing symptoms (Terry & Hynes, 1998; Weisz, McCabe, & Dennig, 1994). A study by Herman-Stahl, Stemmler, and Petersen (1995) found that, over a one-year period, youth who switched from approach to avoidant coping showed heightened depressive symptoms, whereas youth who switched from avoidant to approach coping showed fewer symptoms.

Responses to Stress as a Consequence of Youth Depression

Depression may, in turn, interfere with youths' ability to respond adaptively to peer stress. Depressive symptoms, such as low self-efficacy and self-worth, difficulty concentrating and making decisions, and decreased energy and motivation, may hinder youth from engaging in effective problem solving and lead youth to exhibit more avoidance or inaction in response to peer stress. Depression-linked social withdrawal (Bell-Dolan, Reaven, & Petersen, 1993) may further decrease depressed youths' active engagement with peers to resolve stress.

Beyond symptoms themselves, competence deficits associated with depression may interfere with adaptive stress responses and foster more involuntary stress responses. Research suggests that depressed youth show maladaptive problem-solving styles (Quiggle, Garber, Panak, & Dodge, 1992; Rudolph, Hammen, & Burge, 1994), deficits in conflict negotiation (Rudolph et al., 1994), and helpless behavior (Nolen-Hoeksema, Girgus, & Seligman, 1992) in the context of peer interactions. For example, they endorse fewer assertive and sociable, and more hostile, responses to interpersonal dilemmas than do nondepressed youth (Quiggle et al., 1992; Rudolph et al., 1994). Depression also is associated with emotion regulation deficits (Garber, Braafladt, & Weiss, 1995; Silk, Steinberg, & Morris, 2003), which have been linked to maladaptive coping strategies such as disengagement (Eisenberg, Fabes, & Guthrie, 1997). Together, these competence deficits may lead depressed youth to exhibit fewer effortful,

adaptive responses and more involuntary, maladaptive responses to stress (Hammen & Rudolph, 1996). In addition, depressed youth receive less social support from friends (Klein, Lewinsohn, & Seeley, 1997), thereby reducing opportunities to seek advice or emotional support. Not receiving such provisions may diminish the chance that depressed youth successfully negotiate peer stress.

Finally, depression-related cognitions and perceptions may lead depressed youth to show more disengagement and involuntary responses and fewer engagement responses to stress. Depressed mood primes negative thoughts and memories about the self and one's competencies (Blaney, 1986), causing depressed youth to view peer stressors in a more negative light (Krackow & Rudolph, 2008; Nolen-Hoeksema et al., 1992). Compared to nondepressed youth, depressed youth are more likely to view themselves as unworthy or incompetent and to view their peers as unresponsive and hostile (Garber & Martin, 2002; Rudolph & Clark, 2001; Rudolph, Hammen & Burge, 1997); they also have more negative expectancies about the outcomes of interpersonal encounters (Rudolph et al., 1997) and view problems as less controllable (Abramson, Seligman, & Teasdale, 1978; Rudolph, Kurlakowsky, & Conley, 2001). Collectively, these negative cognitions may undermine coping, which may lead depressed youth to display fewer effortful engagement responses and more involuntary, maladaptive responses to stress.

Only limited research has investigated the contribution of depression and associated distress to youths' responses to stress. For example, one study found that internalizing symptoms predicted more disengagement responses to stress over time (Terry & Hynes, 1998). In another study (Wadsworth & Berger, 2006), anxiety/depressive symptoms marginally predicted more disengagement coping over time.

Reciprocal Associations between Responses to Stress and Depression

Few studies have investigated the reciprocal associations between responses to stress and depression. In one study examining reciprocal associations between a ruminative response style (i.e., the tendency to focus on symptoms and their possible causes and consequences) and psychopathology in female adolescents, Nolen-Hoeksema and colleagues (2007) found that rumination predicted the onset of major depression, and depressive symptoms predicted subsequent increases in rumination. Excessive engagement with symptoms, as reflected in rumination, leads to disengagement from stressors over time (Hong, 2007), potentially because youth with ruminative response styles focus on their symptoms rather than actively resolving stressors. Although this one study documented reciprocal associations between depression and rumination in response to depressive symptoms, research is needed that investigates the association between depression and general responses to stress.

Sex Differences in Responses to Stress -Depression Linkages

The present study also examined whether sex moderated the proposed reciprocal association between responses to stress and depression. We anticipated that responses that fail to successfully address or resolve interpersonal stressors may be more emotionally damaging for girls than for boys, and, reciprocally, depression may have a greater impact on girls' than boys' ability to respond adaptively to stress. Consequently, these reciprocal associations may be stronger in girls than in boys.

Research suggests that girls value interpersonal connectedness more than do boys (Gore, Aseltine, & Colten, 1993; Rose & Rudolph, 2006), which may lead girls to evaluate themselves more negatively as a result of failing to effectively resolve peer stressors. Girls who respond to problems with peers through avoidance or inaction rather than active problem-solving may make

more negative self-evaluations, which may lead to heightened depression; in fact, youth who are especially concerned with maintaining relationships are at higher risk for developing depression following interpersonal disturbances (Cyranowski, Frank, Young, & Shear, 2000; Hammen & Goodman-Brown, 1990). Disengagement and involuntary responses may also generate additional stress within girls' relationships, putting them at even higher risk for depression (Rudolph, Flynn, Abaied, Groot, & Thompson, 2009).

Consistent with these ideas, research reveals sex differences in the concurrent and prospective associations between stress responses and depression. In one study, girls who infrequently disclosed to others when upset experienced more depressive symptoms than did boys (Schraedley, Gotlib, & Hayward, 1999), suggesting that using fewer effortful engagement responses (such as sharing one's emotions) may make girls more vulnerable than boys to depression. In another study, stressful life events predicted depression in girls but not in boys endorsing higher rates of avoidance coping (Blalock & Joiner, 2000). Likewise, a study by Stanton, Danoff-Burg, Cameron, and Ellis (1994) found that approach coping predicted better adjustment for female but not male young adults. Thus, we expected that responses to stress would more strongly predict depression over time in girls than in boys.

Reciprocally, depression may have a greater impact on girls' than boys' ability to respond adaptively to peer stress. Girls' relationships involve more intimate self-disclosure and exchange of emotional provisions than those of boys (Rose & Rudolph, 2006); thus, emotional resources are more critical for the development and maintenance of girls' than boys' relationships. Because depression drains emotional resources and leads to social withdrawal, girls experiencing depression may have an inadequate supply of resources when faced with peer stress. Consequently, they may feel overwhelmed and avoid dealing with interpersonal difficulties, thus

failing to engage with peers to successfully resolve stressors. Indeed, a study by Rudolph, Ladd, and Dinella (2007) found that depressive symptoms predicted declines in the number of friendships and poorer perceived friendship quality in girls but not boys. Potentially, depressed girls may be more likely than depressed boys to exhibit fewer engagement and more disengagement and involuntary responses to stress over time. Thus, we expected that depression would more strongly predict responses to stress over time in girls than in boys.

Overview of the Present Research

Building on transactional interpersonal models of depression (Cicchetti & Toth, 1998; Coyne, 1976; Joiner, 2002), the present research examined the idea that depression would predict maladaptive responses (i.e., fewer effortful engagement responses; more involuntary and disengagement responses) to stress over time, and maladaptive responses to stress would predict subsequent depression. Based on theory and research suggesting the possibility of sex differences in these reciprocal associations, we anticipated stronger effects in girls than in boys. The study used a prospective longitudinal design to examine the proposed associations during late preadolescence and early adolescence, a stage during which depression levels increase at a faster rate in girls than in boys (Ge, Lorenz, Conger, Elder, & Simons, 1994).

METHOD

Participants

Participants were 167 youth (86 girls, 81 boys; *M* age = 12.41 years; *SD* = 1.19) and their female caregivers recruited from several Midwestern towns. Families represented several ethnic groups (77.8% White, 12.6% African American, and 9.6% other ethnic groups and biracial youth) and were diverse in socioeconomic class (16.7% below $30,000, 48.7% $30,000-59,999, 21.6% $60,000-89,999, and 13.0% over $90,000). Youth were selected for this study based on school-wide screenings with the Children's Depression Inventory (CDI; Kovacs, 1980/1981). From the screening sample, youth with a range of CDI scores were recruited, over-sampling slightly for youth with severe symptoms (15.8% of the screening sample, 20.3% of targeted youth, and 24.1% of recruited youth had scores > 18).

Recruitment was based on CDI scores, having a maternal caregiver in the home, and proximity to the university (within one hour). Exclusion criteria included having a non-English speaking maternal caregiver or a severe developmental disability that interfered with the completion of the assessment. Of those invited to participate in the study, participants and nonparticipants did not differ in sex, $\chi^2(1) = .39$, *ns*, ethnicity (white vs. minority), $\chi^2(1) = .02$, *ns*, or CDI scores, $t(280) = 1.11$, *ns*. Participants ($M = 12.41$) were slightly younger than nonparticipants ($M = 12.65$), $t(275) = 2.28$, $p < .05$. Depression scores were available for 167 participants (100%) at Wave 1 (W_1), 159 participants (95%) at Wave 2 (W_2), and 158 participants (95%) at Wave 3 (W_3). Responses to stress scores were available from 165 participants (99%) at W_1, 150 participants (90%) at W_2, and 140 participants (84%) at W_3. Youth with complete data did not significantly differ from those missing data at W_2 and W_3 in age, $t(165) = .77$, *ns*, ethnicity (white vs. minority), $\chi^2(1) = .82$, *ns*, W_1 depression, $t(165) = 1.41$, *ns*,

W_1 effortful engagement, $t(163) = -1.79$, *ns*. W_1 effortful disengagement, $t(163) = .07$, *ns*, or W_1 involuntary engagement, $t(163) = 1.32$, *ns*. Participants missing data at W_2 and W_3 reported higher levels of involuntary disengagement at W_1 ($M = .17$, $SD = .03$) than participants with complete data ($M = .16$, $SD = .03$), $t(163) = 2.39$, $p < .05$, and were more likely to be boys, $\chi^2(N = 167, df = 1) = 8.66$, $p < .01$.

Procedures

Families were recruited through phone calls to the primary female caregivers. Interested families completed a three- to four-hour initial in-person assessment. After providing written informed consent/assent, caregivers and youth were interviewed separately. Two follow-up interviews occurred at one-year intervals. At each assessment, families were compensated for their time with a monetary reimbursement, and youth received a gift certificate.

Measures

Depression. Trained interviewers administered the Schedule for Affective Disorders and Schizophrenia for School-Age Children-Epidemiologic Version-5 (K-SADS-E; Orvaschel, 1995) individually to youth and caregivers to assess youth depression. Interviewers were a faculty member in clinical psychology, a post-doctoral student in clinical psychology, several psychology graduate students, and a post BA-level research assistant. Coding of the interviews took place through consultation with a clinical psychology faculty member or post-doctoral student. Consensual diagnoses were assigned using a best-estimate approach to integrate information across the caregiver and youth report (Klein, Ouimette, Kelly, Ferro, & Riso, 1994). Using Diagnostic and Statistical Manual of Mental Disorders criteria (DSM-IV-TR; American Psychiatric Association, 2000), interviewers assigned ratings of depressive psychopathology on a 5-point scale based on the number, severity, frequency, duration, and resulting impairment of the reported symptoms: 0 = No symptoms, 1 = Mild symptoms, 2 = Moderate symptoms, 3 =

Diagnosis with mild to moderate impairment, and 4 = Diagnosis with severe impairment. Subthreshold symptoms (i.e., mild or moderate) reflected the presence of symptoms that failed to meet one or more of the DSM criteria (e.g., the youth had fewer than the required number of symptoms or had the required number of symptoms for less than the required duration). Separate ratings were assigned for each type of depression (e.g., major depression, dysthymia) based on both diagnosable and subthreshold symptoms experienced during the past month. These ratings were then summed to create continuous depression scores for each wave of the study, such that higher ratings reflect more severe symptoms within a single diagnostic category and/or the presence of symptoms from multiple categories (for similar rating approaches, see Davila, Hammen, Burge, Paley, & Daley, 1995; Hammen et al., 1995; Hammen, Shih, Altman, & Brennan, 2003; Hammen, Shih, & Brennan, 2004; Rudolph, Hammen, Burge, Lindberg, Herzberg, & Daley, 2000). Thus, these scores represent composite indexes of several different markers of depression severity.

Providing evidence for concurrent validity, these scores were significantly correlated with scores on the CDI (Kovacs, 1980/1981, 1992) and the Youth Depression Inventory (Rudolph, 2002) (rs = .46 - .57, ps < .01). Consistent with the use of this continuous index, contemporary conceptualizations of depression, derived in part from taxometric analyses, have suggested that depression is best represented on a dimensional continuum rather than as a discrete category (Fergusson, Horwood, Ridder, & Beautrais, 2005; Hankin, Fraley, Lahey, & Waldman, 2005; Shih, Eberhart, Hammen, & Brennan, 2006). Independent coding of 25% of the interviews yielded strong inter-rater reliability (one-way random-effects intraclass correlation coefficient [ICC] = .98).

Across the three waves of the study, 13.8% (12.3% of boys and 15.1% of girls) experienced diagnostic-level symptoms within the past month (i.e., a rating of 3 or 4). An additional 21.0% (21.0% of boys and 20.9% of girls) experienced mild or moderate symptoms (i.e., a rating of 1 or 2). Thus, a reasonable percentage of participants experienced depressive symptoms over the course of the study.

Responses to stress. Youths' responses to interpersonal stress were assessed using the peer stressor version of the Responses to Stress Questionnaire (RSQ; Connor-Smith et al., 2000). This 57-item measure was designed to assess both voluntary (i.e., effortful coping) and involuntary responses to stress. It includes four subscales, which had adequate internal consistency across waves in the present sample: effortful engagement coping (efforts to resolve stressors or one's response to stressors, such as problem solving and emotion regulation, or to adapt to stressors, such as cognitive restructuring; αs = .86 - .90), effortful disengagement coping (e.g., denial, avoidance, wishful thinking; αs = .78 - .82), involuntary engagement (e.g., rumination, emotional and physiological arousal; αs = .90 - .93), and involuntary disengagement (e.g., inaction, emotional numbing; α = .87 - .89).

In response to a range of peer stressors (e.g., having problems with a friend, being teased or hassled by other kids), participants rated the frequency that they engaged in each response on a scale from 1 (*Not at All*) to 4 (*A Lot*). Consistent with prior research involving this measure (Connor-Smith et al., 2000; Flynn & Rudolph, 2007), to correct for base-rate differences in the endorsement of responses to stress (Compas et al., 2001), proportion scores were calculated as the total score for each of the four subscales divided by the total score on the RSQ. This scoring method provides an index of how much individuals engage in a particular type of response relative to other responses (see Osowiecki & Compas, 1999; Vitaliano, Maiuro, Russo, &

Becker, 1987). Higher scores indicate greater enactment of each type of response to stress. Convergent validity and retest reliability have been established for these subscales (Connor-Smith et al., 2000).

RESULTS

Preliminary Analyses

Table 1 presents descriptive data for depression and responses to stress, separately for girls and boys at each wave. A repeated measures multivariate analysis of variance (MANOVA) was conducted on the study variables with Sex as a between-subjects factor and Wave as a within-subjects factor. This analysis revealed a significant multivariate main effect of Sex, $F(5, 128) = 2.76$, $p < .05$. Nonsignificant multivariate effects were found for Wave, $F(10, 123) = 1.34$, *ns*, and the Sex x Wave interaction, $F(10, 123) = 1.61$, *ns*. Examination of the univariate effects revealed a significant main effect of Sex for effortful engagement, $F(1,132) = 5.89$, $p < .05$, effortful disengagement, $F(1, 132) = 4.76$, $p < .05$, and involuntary disengagement, $F(1, 132) = 8.38$, $p < .01$. Girls ($M = .50$, $SD = .07$) reported higher levels of effortful engagement than did boys ($M = .47$, $SD = .07$). Boys ($M = .14$, $SD = .03$) reported higher levels of effortful disengagement than did girls ($M = .14$, $SD = .03$), and boys ($M = .16$, $SD = .02$) reported higher levels of involuntary disengagement than did girls ($M = .15$, $SD = .03$). No sex differences were found for involuntary engagement, $F(1, 132) = 1.45$, *ns*, or depression, $F(1, 132) = .20$, *ns*. The absence of a sex difference in depression is likely due to the fact that this sex difference tends to emerge during middle adolescence (about age 13; e.g., Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Ge et al., 1994; Rudolph & Hammen, 1999), and more than half of the present sample was younger than 13 years old.

Intercorrelations

Table 2 displays the intercorrelations among the variables for girls and boys. To provide descriptive information about the reciprocal associations between responses to stress and depression, we examined the cross-wave correlations. W_1 effortful engagement was negatively

associated with W_2 depression in both girls and boys, but this association was significantly stronger in girls than in boys ($Z = -1.85$, $p < .05$). In girls but not in boys, W_2 effortful engagement was negatively associated with W_3 depression, and this association was marginally stronger in girls than in boys ($Z = -1.44$, $p < .10$). W_1 effortful disengagement was positively associated with W_2 depression in girls but not in boys, and this association was marginally stronger in girls than in boys ($Z = 1.36$, $p < .10$). There were no significant associations between W_2 effortful disengagement and W_3 depression in girls or boys. W_1 involuntary engagement was positively associated with W_2 depression in both girls and boys, and this association did not significantly differ across sex ($Z = 0.18$, *ns*). W_2 involuntary engagement was positively associated with W_3 depression in girls but not in boys, and this association was marginally stronger in girls than in boys ($Z = 1.56$, $p < .10$). W_1 involuntary disengagement was positively associated with W_2 depression in girls but not in boys, and this association was significantly stronger in girls than in boys ($Z = 3.09$, $p < .01$). W_2 involuntary disengagement was positively associated with W_3 depression in both girls and boys but this association was marginally significantly stronger in girls than in boys ($Z = 1.29$, $p < .10$).

W_1 depression was negatively associated with W_2 effortful engagement in boys but not in girls, whereas W_2 depression was negatively associated with W_3 effortful engagement in girls but not in boys; neither of these differences was significant ($Z = .77$, *ns*, and $Z = -.57$, *ns*, respectively). W_1 depression was positively associated with W_2 effortful disengagement in boys but not in girls, and this association was significantly stronger in boys than in girls ($Z = -1.75$, $p < .05$). There were no significant associations between W_2 depression and W_3 effortful disengagement in boys or girls. W_1 depression was not significantly associated with W_2 involuntary engagement in boys or girls. W_2 depression was positively associated with W_3

involuntary engagement in girls but not in boys but this difference was not significant ($Z = 0.46$, *ns*). W_1 depression was positively associated with W_2 involuntary disengagement in both girls and boys, and this association did not significantly differ across sex ($Z = 0.83$, *ns*). Finally, W_2 depression was positively associated with W_3 involuntary disengagement in girls but not in boys, and this association was marginally stronger in girls than in boys ($Z = 1.35$, $p < .10$).

Tests of Reciprocal Associations

Path analyses were conducted with AMOS Version 7.0 (Arbuckle, 2006) to examine the reciprocal associations between responses to stress and depression. AMOS uses the full information maximum likelihood (FIML) estimation method to handle missing data (Arbuckle, 1999). At each wave, depression was represented by a manifest variable reflecting the continuous scores derived from the K-SADS. Responses to stress were represented by manifest variables reflecting the four subscales of the RSQ. Separate models were tested for each type of response to stress (effortful engagement, effortful disengagement, involuntary engagement, and involuntary disengagement).

As shown in Figure 1, the models included cross-lagged paths reflecting the hypothesized reciprocal associations between responses to stress and depression, and autoregressive paths reflecting the stability of the variables over time. The models also included the within-wave correlation between responses to stress and depression at W_1. Finally, the error variances for the same measures at W_2 and W_3 were allowed to correlate.

To examine the moderating effect of sex, we conducted multi-group comparison analyses. Specifically, we compared a constrained model (i.e., one in which the paths of interest were set to be equal across sex) with an unconstrained model (i.e., one in which the paths of interest were allowed to vary across sex). To assess model fit, we examined the χ^2/df ratios, the

Comparative Fit Index (CFI; Bentler, 1990), the Incremental Fit Index (IFI; Bollen, 1990), and the Root Mean Square Error of Approximation (RMSEA; Steiger, 1990). Good model fit is reflected in χ^2/df ratios of less than 2.5 or 3 (Kline, 1998), CFI and IFI values above .90 (Bentler, 1990; Bollen, 1990; Kline, 1998), and RMSEA values of .05 to .08 (Browne & Cudeck, 1993). We used χ^2 difference tests to compare the fit of the constrained versus unconstrained models.

Consistent with the expectation that the fit of the models would differ in girls and boys, χ^2 difference tests revealed that the unconstrained model fit significantly better than the constrained model for all four types of stress responses (effortful engagement: $\Delta\chi^2(1) = 22.80$, $p < .01$; effortful disengagement: $\Delta\chi^2(1) = 9.40$, $p < .01$; involuntary engagement: $\Delta\chi^2(1) = 6.62$, $p < .05$; and involuntary disengagement: $\Delta\chi^2(1) = 38.93$, $p < .01$). In addition, the fit of the unconstrained models was generally good (effortful engagement: $\chi^2(8) = 12.84$, *ns*, $\chi^2/df = 1.60$, CFI = .99, IFI = .99 RMSEA = .06; effortful disengagement: $\chi^2(8) = 15.79$, $p < .10$, $\chi^2/df = 1.97$, CFI = .98, IFI = .98, RMSEA = .08; involuntary engagement: $\chi^2(8) = 24.05$, $p < .01$, $\chi^2/df = 3.01$, CFI = .96, IFI = .96, RMSEA = .11; and involuntary disengagement: $\chi^2(8) = 12.26$, *ns*, $\chi^2/df = 1.53$, CFI = .99, IFI = .99, RMSEA = .06). The RSMEA value and χ^2/df ratio for involuntary engagement were slightly outside the range indicated for good model fit, suggesting that this model was a poorer fit than the other models.

Figure 1 displays the standardized path coefficients in girls and boys for the four unconstrained models. In girls but not in boys, W_1 effortful engagement significantly predicted less W_2 depression, and W_2 effortful engagement significantly predicted less W_3 depression. Also in girls but not in boys, W_1 involuntary disengagement significantly predicted more W_2 depression, and W_2 involuntary disengagement significantly predicted more W_3 depression.

Finally, in girls but not in boys, W_1 effortful disengagement marginally predicted more W_2 depression.

In boys but not in girls, W_1 depression significantly predicted less W_2 effortful engagement and more W_2 involuntary disengagement. Also in boys but not in girls, W_1 depression marginally predicted more W_2 involuntary engagement.

DISCUSSION

The present study investigated reciprocal associations between responses to peer stress and depression, as well as how sex moderated these associations. We hypothesized that depression would predict fewer effortful engagement responses and more involuntary and disengagement responses over time; these responses would then predict more depression over time. Support was found for both directions of effect, although the effects varied across sex. In girls but not in boys, effortful engagement significantly predicted less depression at each wave, and involuntary disengagement significantly predicted more depression at each wave. In addition, W_1 effortful disengagement marginally predicted more W_2 depression in girls. Contrary to expectations, in boys but not in girls, W_1 depression significantly predicted less W_2 effortful engagement and more W_2 involuntary disengagement. Likewise, W_1 depression marginally predicted more W_2 involuntary engagement in boys.

Responses to Stress and Depression in Girls

In girls only, maladaptive stress responses predicted more depression over time; thus, engaging in adaptive responses to peer stressors may be more important for girls' than boys' psychological well-being. Girls who respond to peer stress by involuntary avoiding stressful situations rather than engaging in purposeful efforts to cope may be judged as lacking investment or interest in relationships, potentially leading to decreases in friendship quality and social support. Given that girls are more likely than boys to seek emotional support from others in response to stress (Rose & Rudolph, 2006), they may rely on this support to weather interpersonal difficulties. Thus, responding maladaptively to peer stress may be more emotionally damaging for girls than boys, putting them at greater risk for depression. Furthermore, girls who fail to effectively address peer stress may appraise themselves more

negatively than boys, and experience low self-efficacy and self-worth, hopelessness, and other symptoms of depression (Cicchetti et al., 1994; Garber et al., 1993; Hankin & Abramson, 2001).

Inconsistent with our hypotheses, depression did not predict responses to stress in girls. To investigate the possibility that greater temporal stability of girls' relative to boys' stress responses accounted for why girls' responses were less influenced by their mood states, we conducted supplemental analyses in which the stability of girls' and boys' stress responses over each wave were constrained to be equal. Analyses were rerun, and no substantive differences in the results were found. However, several of the cross-wave zero-order correlations were significant in girls: W_1 depression predicted more W_2 involuntary disengagement, and W_2 depression predicted less W_3 effortful engagement and more W_3 involuntary engagement and disengagement. Thus, although constraining the stability of stress responses did not change the pattern of sex differences, it is possible that stability in stress responses partially explains why depression did not predict maladaptive interpersonal stress responses in girls.

In light of research suggesting that cognitive attributions and appraisals play a role in shaping coping responses (Amirkhan, 1998; Shelton & Harold, 2008), it is also possible that girls' stress responses are predicted not by depression but by other factors, such as their cognitive style. Considering that girls place greater value on interpersonal connectedness than do boys (Gore et al., 1993; Rose & Rudolph, 2006), they may make more negative inferences as a result of peer stress; in fact, negative attributional styles appear to be more prevalent in girls than in boys (Hankin & Abramson, 2002; Nolen-Hoeksema & Girgus, 1994). Although negative attributional styles are associated with vulnerability to depression, they are considered relatively fixed and stable by early adolescence, and do not always fluctuate with levels of depression (Nolen-Hoeksema et al., 1992). Thus, it is possible that girls' responses to stress are explained

more by these or other stable characteristics than by fluctuations in depression. Additional research is needed to identify possible predictors of girls' stress responses.

Responses to Stress and Depression in Boys

In contrast to the findings for girls, depression predicted more maladaptive stress responses in boys, suggesting that depression and associated deficits may hinder boys' ability to respond adaptively to peer stress. A study by Nowicki and Carton (1997) found that nonverbal processing deficits, which are associated with lower social competence (Nowicki & Duke, 1994a), are related to depressive symptoms in boys but not in girls, suggesting that depressed boys but not girls have particular social processing deficits that may interfere with adaptive stress responses. Depressed boys also show more aggression than depressed girls, making them more likely to respond to peer stress in maladaptive ways. Several studies report stronger connections between depression and outward anger, aggression, and hostility in males than in females in both adults (e.g., Fava, Nolan, Kradin, & Rosenbaum, 1995; Winkler, Pjrek, & Kasper, 2005) and youth (Renouf & Harter, 1990). Anger and aggression may interfere with the production of adaptive stress responses; in fact, aggressive children display fewer assertive, planful, and prosocial responses to peer conflicts (Dodge, 1993). This heightened link between depression and aggression in boys relative to girls may help to explain why depression predicted maladaptive stress responses in boys but not in girls.

Implications for Theory and Research

Consistent with transactional interpersonal models of depression (Cicchetti & Toth, 1998; Coyne, 1976; Joiner, 2002), our findings revealed associations between youths' responses to their social environment and depression, although the significant direction of effect varied for girls and boys. Responding with fewer effortful, planful responses and more involuntary,

dysregulated responses to peer stress predicted greater depression over time in girls but not in boys, and depression predicted fewer effortful, planful responses and more involuntary, dysregulated responses over time in boys but not in girls. These results are consistent with previous findings linking maladaptive stress responses with poorer psychological adjustment, and adaptive stress responses with better psychological health (for a review, see Compas et al., 2001). Moreover, our findings clarify the direction of association between stress responses and depression, as well as how sex moderates these associations.

Because our study focused on responses to interpersonal stress, it is not clear whether these findings would generalize to other types of stress. Boys generally experience higher levels of stress within noninterpersonal contexts (e.g., academics) and lower levels of stress within interpersonal contexts than do girls (Rudolph & Hammen, 1999); it is possible, therefore, that noninterpersonal stressors are more salient in boys, and thus responses to these stressors may be more relevant to understand boys' depression. Future research is needed to elucidate how sex moderates the association between depression and responses to stress within different domains.

Research also is needed to identify the processes through which stress responses contribute to depression, and depression contributes to stress responses, as well as sex differences in these processes. For example, girls who fail to effectively resolve peer stressors may evaluate themselves negatively or generate additional stress in their relationships, making them more vulnerable to depression than boys, whereas depressed boys may show increased aggression, potentially leading them to demonstrate more maladaptive responses to stress than girls.

Limitations

A few limitations of this study should be noted. Although a reasonable percentage of the sample experienced depressive symptoms over the course of the study, the majority of participants were not severely depressed. Although we would expect replication in youth with diagnostic-level depression, future research needs to confirm this notion. Youth experiencing depression also may provide less accurate reports on stress responses; specifically, mood-congruent recall (Murray, Whitehouse, & Alloy, 1999) may result in selective recall of maladaptive responses (i.e., responses that failed to resolve stress and/or led to negative outcomes). Although our assessment of depression integrated youth and caregiver reports, responses to stress were assessed through self-report; future research would benefit from a multi-informant, multi-method approach to assessing stress responses.

Implications for Interventions Targeting Youth Depression

Our findings suggest that maladaptive stress responses have a greater impact on girls' than boys' risk for depression, whereas depression has a greater impact on boys' than girls' ability to produce adaptive responses. Thus, the type and point of interventions to address youth depression should differ by sex. Specifically, targeting maladaptive stress responses may be more effective in reducing girls' than boys' risk for depression, whereas targeting boys' mood states may help them to develop more adaptive stress responses, in turn increasing their social competence and supporting the establishment of healthy relationships that would be protective against depression.

Conclusion

The current study found that the association between responses to peer stress and depression differed by sex; namely, depression predicted fewer adaptive stress responses over time in boys but not in girls. In turn, maladaptive responses to peer stress predicted more

depression in girls but not in boys, whereas adaptive responses predicted less depression in girls but not in boys. Thus, appropriate and effective responses to stress may be crucial for youths' positive emotional adjustment. Likewise, addressing emotional difficulties may, in turn, improve the adaptiveness of youths' stress responses, potentially protecting youth from future psychopathology.

FIGURES AND TABLES

Table 1

Descriptive Statistics

	Wave 1				Wave 2				Wave 3			
	Girls		Boys		Girls		Boys		Girls		Boys	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Depression	.67	1.41	.65	1.32	.70	1.39	.51	.98	.52	1.16	.49	1.05
Effortful Engagement	.48	.08	.46	.07	.50	.08	.47	.08	.51	.07	.47	.07
Effortful Disengagement	.14	.03	.15	.03	.13	.03	.14	.02	.14	.03	.14	.03
Involuntary Engagement	.23	.05	.23	.04	.21	.05	.22	.04	.21	.04	.23	.04
Involuntary Disengagement	.16	.04	.17	.03	.15	.03	.16	.03	.15	.03	.17	.03

Table 2

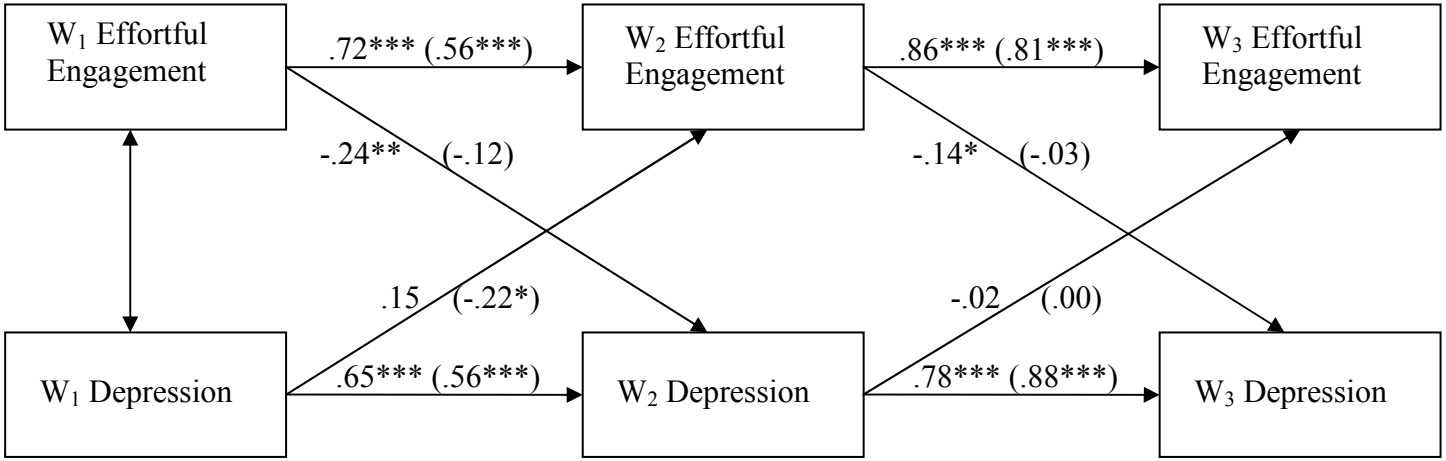
Intercorrelations Among the Variables

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. W_1 Depression	--	-.41**	.17	.31**	.41**	.74**	-.16	-.04	.17	.23*	.61**	-.11	-.03	.09	.18
2. W_1 Effortful Engagement	-.23*	--	-.62**	-.79**	-.84**	-.52**	.67**	-.42**	-.60**	-.55**	-.45**	.58**	-.32**	-.43**	-.55**
3. W_1 Effortful Disengagement	.16	-.44**	--	.13	.57**	.25*	-.44**	.50**	.25*	.37**	.21	-.35**	.47**	.09	.33**
4. W_1 Involuntary Engagement	.23*	-.83**	.02	--	.42**	.31**	-.52**	.23*	.57**	.37**	.33**	-.48**	.11	.50**	.39**
5. W_1 Involuntary Disengagement	.08	-.78**	.07	.54**	--	.61**	-.55**	.32**	.46**	.53**	.45**	-.46**	.28*	.27*	.54**
6. W_2 Depression	.60**	-.26*	.04	.28*	.20	--	-.32**	.03	.35**	.33**	.82**	-.29**	-.03	.25*	.41**
7. W_2 Effortful Engagement	-.28*	.59**	-.31*	-.52**	-.40**	-.16	--	-.63**	-.86**	-.87**	-.39**	.73**	-.45**	-.62**	-.53**
8. W_2 Effortful Disengagement	.25*	-.24*	.42**	.09	.04	-.05	-.44**	--	.23*	.45**	.10	-.45**	.56**	.21	.28*
9. W_2 Involuntary Engagement	.10	-.47**	.12	.48**	.34**	.16	-.88**	.06	--	.63**	.36**	-.67**	.24*	.72**	.42**
10. W_2 Involuntary Disengagement	.36**	-.62**	.27*	.54**	.46**	.21	-.87**	.23	.69**	--	.43**	-.59**	.35**	.40**	.57**
11. W_3 Depression	.54**	-.23*	.14	.20	.15	.81**	-.17	.03	.11	.24*	--	-.33**	.09	.26*	.40**
12. W_3 Effortful Engagement	-.30*	.49**	-.44**	-.32*	-.29*	-.20	.59**	-.32*	-.48**	-.53**	-.35**	--	-.62**	-.81**	-.77**
13. W_3 Effortful Disengagement	.12	-.25*	.41**	.08	.11	.06	-.34**	.47**	.18	.26	.28*	-.62**	--	.17	.38**
14. W_3 Involuntary Engagement	.38**	-.40**	.31*	.32*	.20	.18	-.53**	.18	.47**	.51**	.28*	-.84**	.24	--	.43**
15. W_3 Involuntary Disengagement	.17	-.47**	.33**	.31*	.35**	.20	-.45**	.14	.40**	.42**	.23	-.82**	.34**	.54**	--

Note. Correlations above the diagonal are for girls; correlations below the diagonal are for boys.
*$p < .05$. **$p < .01$.

Figure 1. Path models of reciprocal associations between responses to stress and depression for (a) effortful engagement, (b) effortful disengagement, (c) involuntary engagement, and (d) involuntary disengagement. Path coefficients without parentheses are for girls; path coefficients in parentheses are for boys. ^$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Figure 1 (cont.) (a) Effortful Engagement



(b) Effortful Disengagement

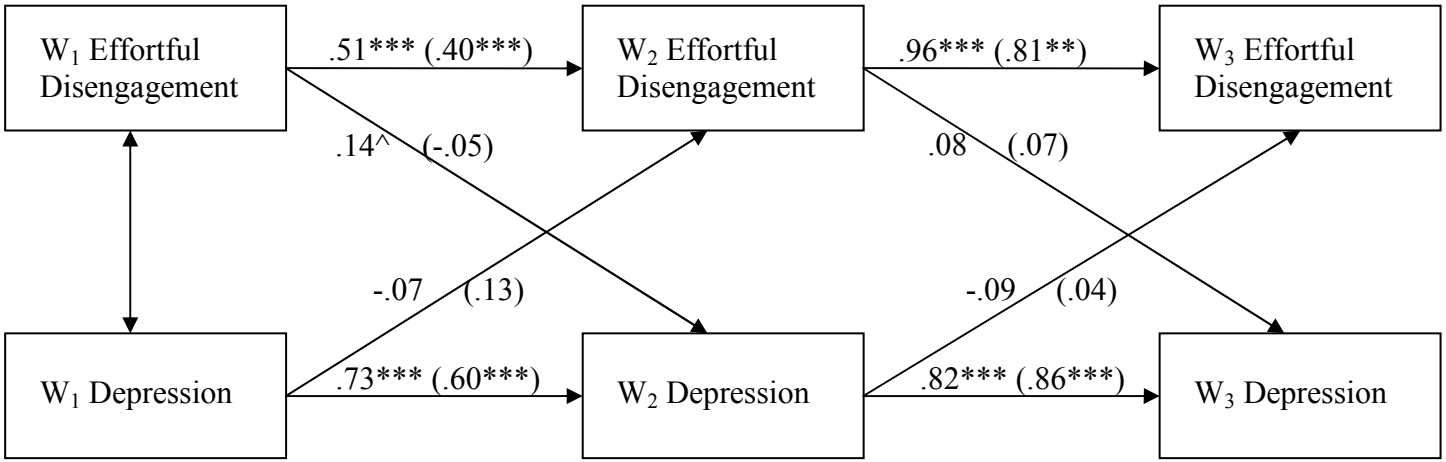
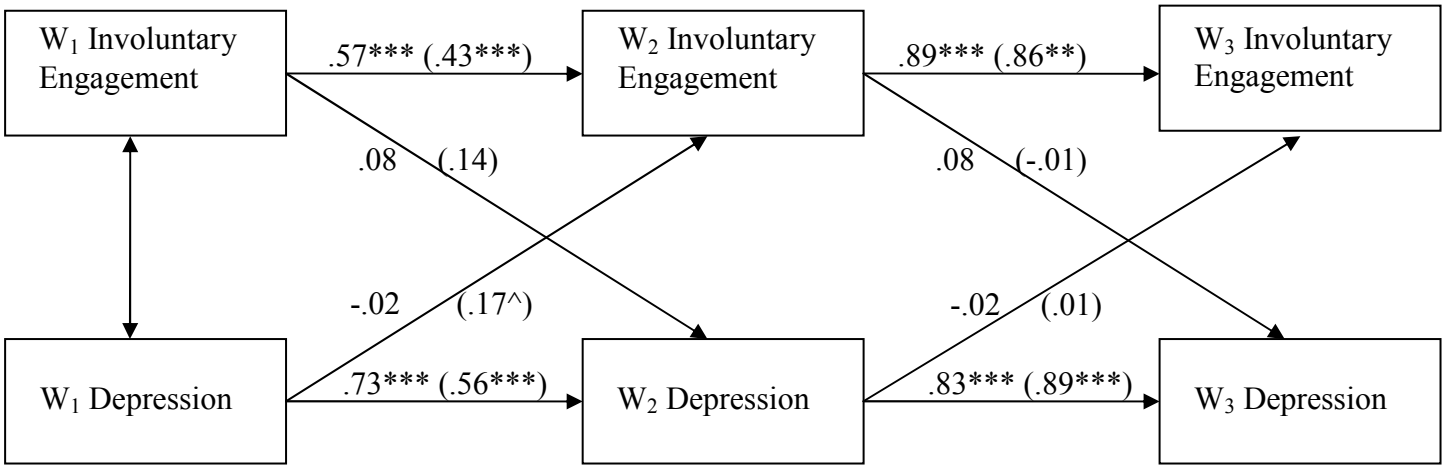
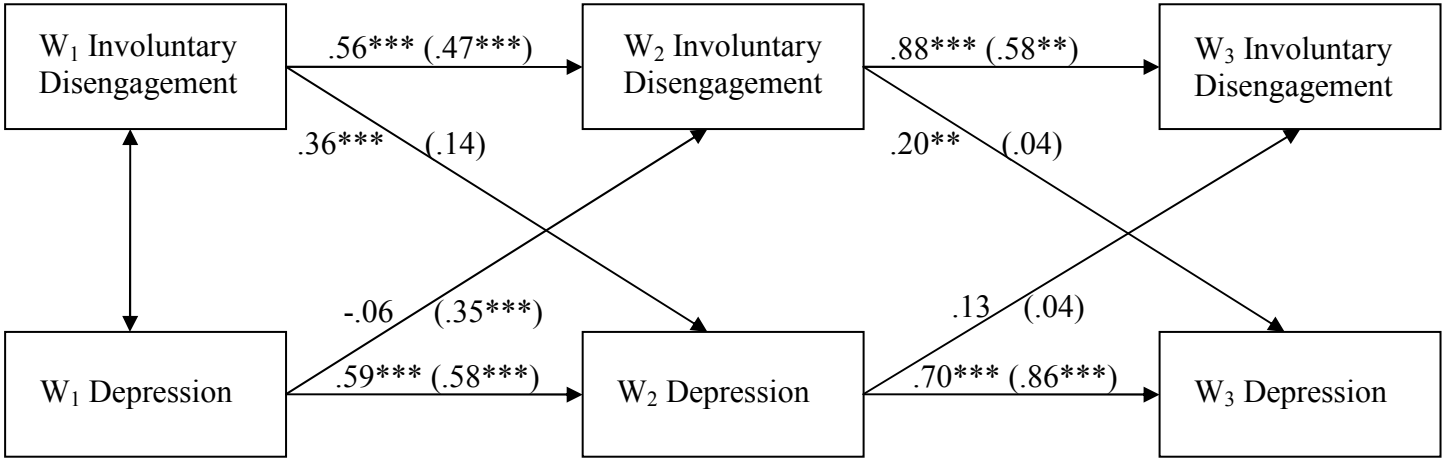


Figure 1 (cont.) (c) Involuntary Engagement



(d) Involuntary Disengagement



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